

of Mr. Alexander Matthews, at Chachapoyas, on the Andes of Peru, is here recorded. This lamented botanist is well known to our readers as having been a most indefatigable and successful collector of plants in Chili and Peru.—A Letter from Mr. Jas. Drummond on the Botany of Swan River, in Western Australia.]—Boissier on Spanish Botany (No. 8.).—Notice of the life and labours of A. Guillemin, M.D. (No. 8.).—Observations on the genus *Hemitelia*; by G. Gardner, Esq. (No. 8.).—Observations on a new species of *Eriocaulon*, from Brazil; by G. Gardner, Esq. (No. 8.).—On *Oakesia*, a new genus of *Empetrea*; by E. Tuckerman, Esq. (No. 8.).—Descriptions of *Fungi*; by the Rev. M. J. Berkeley, M.A. (Nos. 8, 9.).—On two S. American species of *Chrysanthemum*; by Sir W. J. Hooker (No. 9.).—Contributions towards a Flora of S. Africa; by Prof. Meisner (No. 9.).—On the Vegetation of Hong Kong, by R. B. Hinds, Esq.; and an enumeration of the plants collected, by G. Bentham, Esq. (No. 9.).—Contributions to a Flora of Brazil; by G. Gardner, Esq. (No. 10.).—Botanical Excursions in S. Africa; by C. J. F. Bunbury, Esq. (No. 10.).

The Phytologist : a Botanical Journal.

No. 14, July 1842, to No. 17, Oct. 1842.

Contents:—Notice of the Linnæan Transactions (contained in No. 14.).—List of *Jungermanniæ*, &c. observed near Dumfries; by Mr. Jas. Cruickshank (No. 14.).—Notes on the genus *Utricularia*; by the Rev. J. B. Brican (No. 14.).—Varieties (Nos. 14, 15, 16, 17.).—Proceedings of Societies (Nos. 14, 15, 16, 17.).—History of the British Equiseta, *E. hyemale*; by Edw. Newman, Esq. (Nos. 15, 16, 17.).—List of Plants observed near Manchester; by Dr. Wood (No. 15.).—Notice of Transactions of Botanical Society (Nos. 15, 16, 17.).—On the authority upon which several plants have been introduced into the 'Catalogue of British Plants' published by the Botanical Society; by Charles C. Babington, Esq. (No. 16.).—On the nature of the Byssoid substance found investing the roots of *Monotropa Hypopitys*; by T. G. Rylands, Esq. (No. 17.). [In this valuable paper the author shows that this substance consists of four species of *Fungi*, which are named, described and figured.]

PROCEEDINGS OF LEARNED SOCIETIES.

BOTANICAL SOCIETY OF LONDON.

Sept. 3, 1842.—John Reynolds, Esq., Treasurer, in the Chair.

Mr. B. D. Wardale presented numerous specimens of *Lastrea cristata* (Presl), collected at Bawsey Bottom, near Lynn, Norfolk. Mr. Thomas Twining, Jun., exhibited a large collection of cultivated specimens from Twickenham.

A paper was read from Mr. R. S. Hill, being "An Inquiry into Vegetable Morphology."

Morphology is that division of botany which takes cognisance of

the various changes which occur in the condition of the vegetable organs ; both such as are normal, as the transmutation of leaves into the several floral organs, as well as such as are abnormal, and occur only accidentally.

Taking the above as the definition of the subject, we immediately see its divisibility into two heads ; the first of which treats of regular metamorphoses which are connected with the natural structure of all vegetables ; while the second includes those irregular or accidental metamorphoses which result from an imperfect or redundant performance of the several changes noticed under the first head.

These last influence particular plants or parts of plants, and occur only in occasional instances. To this division belongs the consideration of double and other monstrous flowers.

Of regular metamorphoses.—The great principle of regular morphology is, that the various floral organs are but modifications of one common type, which is the leaf.

Lindley endeavours to give Linnæus the credit of having been the author, or at least of having suggested the idea of this great fundamental principle, and in proof of this opinion quotes passages from his 'Systema Naturæ' and 'Prolepsis Plantarum,' in which the theory is imperfectly hinted at. At his suggestion the subject does not appear to have been taken up ; nor was it at all until Goethe published in 1770 his work 'On Vegetable Metamorphosis.' With a knowledge of the character of his poetical writings, it hardly need excite surprise, that botanists of the day should have been sceptical on a subject so new, and at first sight so opposed to the dictates of common sense. By the appearance of this work however the attention of botanists appears to have been roused to the subject, and the result of their investigations tended to confirm the correctness of his views.

Leaves are in many instances entirely wanting, or exist only in the degenerated forms of scales and spines. In these cases there is hardly any part of a plant which is not susceptible of being modified and rendered capable of performing the functions of leaves. For this purpose we find the excessive development of the stem which obtains throughout lactaceous plants ; also the stem is furnished with leafy wings or expansions which run down its sides, as is seen in *Acacia ciliata*, &c. The petiole, in the form of the *Phyllodium*, frequently takes upon itself the office of the leaf, as in most of the Acacias from New Holland. The same functions are frequently discharged by the peduncle, as in *Ruscus*, *Asparagus*, &c. ; and this appears to be the true character of the leafy organs of ferns, the true leaves of which exist in the degenerated form of scales, known by the name of ramenta.

The calyx consists of a series of leaves arranged in a whorled manner round the axis, either distinct, or more or less combined, according to the character of the plant under consideration.

To prove our position with this series of a genus, we must refer to the condition of parts in *Cactaceæ*, where we have a gradual transition from bractæ to sepals, so that it is impossible to say where

the one terminates and the other begins. Examples of partial reversion of the calyx to the character of the leaf are seen in specimens of *Trifolium repens*, the *Polyanthus* of the gardens, and in cultivated roses. In monstrous specimens we sometimes meet with the petals becoming leafy, of which M. DeCandolle gives a remarkable example in *Anemone nemorosa*, and the author had not unfrequently seen the same condition occurring in the petals of *Papaver Argemone*. Stamens appear to be formed from petals by the gradual narrowing of their lower part, so as to form the filament, while the anthers develop themselves on the upper margins. The only instance with which the author was acquainted where the carpellary leaf is to be found in an expanded or unfolded state naturally occurs in the order *Coniferae*, where it simply covers but does not inclose the ovules. The carpellary leaf in this condition manifestly approaches a bractea. It was announced that the paper would be continued at the next meeting.

Mr. Adam White laid before the Society a selection of the plants he found in the beginning of August last, at Whiting Bay, Isle of Arran. He made some observations on the mild climate of the sheltered coast, where, even during winter, as Dr. M'Naughton, in the 'New Statistical Account of Scotland,' writes, "many of the plants of warmer regions stand the whole winter in the open air, as in Mr. Paterson's garden, at the Whitehouse, and in the Duke of Hamilton's at Broderick Castle." He referred to the Rev. David Landsborough's list of the rarer plants found in Arran, and to Professor Gardner, of Glasgow, having lately found the *Funaria Muhlenbergii* in tolerable abundance, when on a trip with Mr. Landsborough.

ZOOLOGICAL SOCIETY.

Dec. 14, 1841.—Richard Owen, Esq., Vice-President, in the Chair.

The following paper, by Mr. Lovell Reeve, "On *Lingula*, a genus of Brachiopodous Mollusks," was then read:—

"The *Lingula* belong to a group of Bivalve Mollusks differing materially in their system of organization from any other of the great tribe of *Acephala*. They have received the title of 'the *Brachiopoda*,' on account of their being provided with two long spirally twisted arms, and are distinguished by other not less important particulars. The soft parts are differently arranged within the shell from those of other Bivalves; the valves are not united by any ligament, and there is a very distinct change in the arrangement and position of the breathing apparatus. Although Pallas has given a short anatomical description of the *Terebratulae*, it was not until the appearance of Cuvier's memoir on the anatomy of *Lingula*, that the true characters of these remarkable animals became known; it was then determined that the *Brachiopoda* should be set apart in a separate and distinct class. The anatomy of the *Terebratulae* and *Orbiculae* has since been most elaborately set forth by Prof. Owen in the Transactions of this Society, and agrees in all its essential par-

ticalars with that of the *Lingula* previously described by Cuvier; subject, however, to certain modifications arising from the different situations they inhabit. The *Lingulae*, which are provided with a long pedicle, commonly live near the surface, and are found at low water, partially buried in the sand for the protection of their fragile shells against the violence of the tides; the *Terebratulæ*, on the contrary, are found in deep water, attached in clusters to fragments of rocks and corallines by a bunch of short fibrous tendons issuing through an orifice in the shell.

“The essential points in which these animals differ from other Bivalve Mollusks are as follow:—*First*, in the position of the soft parts within the shell: in the *Brachiopoda* the dorsal part of the visceral mass is against one valve, and the ventral part against the other; whilst in most of the *Tropiopoda* the back is placed directly against the hinge, and the sides against each valve. *Secondly*, in being provided with a pair of retractile brachia or arms: in the place usually occupied by the branchiæ, are two long spirally twisted arms, generally more or less fringed, and so strongly resembling in some species the branchiæ of the *Tropiopoda*, that they were at one time thought to be the true organs of respiration. These retractile arms are said to be in constant activity for the purpose of producing an inward current of water for the capture of animalculæ, and other alimentary prey. *Thirdly*, in the arrangement and position of the branchiæ: instead of the organs of respiration being distinctly formed in lateral lamellæ upon the body, as in the *Lamelli-branchiate Tropiopoda*, they consist of a number of beautiful veins and arteries incorporated within the substance of the two lobes of the mantle. The calcifying organ of the *Brachiopoda* therefore has a double function: in addition to its usual property of secreting the calcareous mucus for the formation of the shell, it is made subservient to the circulation of the aërated water. Prof. Owen observes, ‘that in this profuse distribution of vessels over a plain membranaceous surface, we perceive the simplest construction of the *water-breathing* organ, presenting a beautiful analogy with the elementary forms of the *air-breathing* organ in the *pulmoniferous Gasteropoda*.’ In consequence of this new arrangement of the respiratory system, the title of the *Brachiopoda* has been changed by De Blainville for that of the *Palliobranchiata*, or mantle-breathing Mollusca. The muscular system in these animals appears to be most complex; the *Lingula* and *Orbiculæ* are provided with three pairs of muscles, and the *Terebratulæ* have four. The large muscles are destined to open and close the shell in the absence of a hinge ligament; and the small ones assist in sliding one valve over the other for the admission of water.

“Until within the last few years only one species of *Lingula* was known, and previous to the publication of Cuvier’s memoir, before alluded to, the shell of this singular animal gave rise to much speculation amongst naturalists. Linnæus, upon the discovery of an odd valve of *Lingula* exhibiting no trace of any hinge ligament, described it as a *Patella*. Both Rumphius and Favanne took it to be the

calcareous shield of a *Limax* or land-slug. Chemnitz, upon finding that the shell of *Lingula* was really bivalve, placed it with the *Pinnæ*; and even Dillwyn includes it with the *Mytili*. Bruguière was the first to distinguish it by its present title in the plates of the 'Encyclopédie Méthodique,' in which he has been followed by Cuvier, Lamarck, and all succeeding writers.

"With regard both to the situation that the *Brachiopodous Mollusca* should occupy in the natural system, as well as the rank to which they are entitled in the classification, authors have been much divided. By Dumeril and De Roissy they were associated in a particular class with the *Lepades*, on account of a fancied resemblance in their spirally twisted arms to the cirrous tentacula of those animals; they differ however in not being articulated, and their relation altogether with the *Lepades* is one of very remote analogy. Cuvier distinguished them as a new and separate class, but still arranged them next in order to the *Lepades*. Lamarck placed them at the end of his '*Conchiferes monomyaires*' merely as a family of that order. Prof. Owen and Deshayes both consider that they are entitled to take the rank of an order; the latter author however admits that there is far less affinity between the *Brachiopoda* and the rest of the acephalous mollusks, than there is between the acknowledged divisions of *Bimuscular* and *Unimuscular*. In the arrangement of my 'Systematic Conchology' I propose to adopt the still higher rank that was assigned to them by Cuvier, namely, that of a class, placing them according to Lamarck, at the end of the *Acephala*, upon the presumption that their branchial apparatus presents a modification of structure intermediate between that of the proximate classes, the *Tropiopoda* and the *Gasteropoda*.

"The *Lingula* come with great propriety at the commencement of the class, because they have the nearest affinity with the *Tropiopoda*; their body is larger in proportion to that of the rest of the *Brachiopoda*, and although the branchiæ are incorporated within the substance of the mantle, they nevertheless present a certain indication of the lamellar structure. Lamarck placed them at the end of his family of '*Les Brachiopodes*,' because, in having referred the *Cranicæ* to his fossil family of '*Les Rudistes*,' he found it necessary to follow up their affinity with the *Orbiculæ*; his arrangement of the genera therefore is the reverse of that I have adopted.

"The *Lingula anatina* was for a long time the only species known, another one, the *Lingula hians*, was described by Swainson in his 'Zoological Illustrations,' and we are indebted to Mr. Cuming for five new ones; two, the *Lingula Audebardii* and *semen*, have been already described by Mr. Broderip in the Transactions of this Society, and I have now the pleasure of introducing three which I believe to be entirely new to science.

LINGULA OVALIS. *Ling. testâ angustâ, elongato-ovali, glabrâ quasi politâ, olivaceo-viridi; apice acuminato; valvis utrinque clausis.*
Hab. — ?

Long. $1\frac{3}{10}$; lat. $\frac{6}{10}$ poll.

“This shell, which approaches rather in appearance to that of the *Lingula anatina*, may nevertheless be distinguished by its complete oval form; though it is somewhat acuminate at the apex, the umbones are much less prominent, and the valves are more compressed, and more closely united all round.

LINGULA TUMIDULA. *Ling. testâ corned, tenuissimâ, rubro-olivaceâ, subquadrata, versus apicem parùm attenuatâ, umbonibus vix prominulis; valvis tumidulis, marginibus irregulariter reflexis.*

Hab. ad oras Novæ Hollandiæ.

Long. $2\frac{1}{10}$; lat. $1\frac{5}{10}$ poll.

Reeve, *Conch. Syst.* v. i. p. 180. pl. 125. f. 4.

“The shell of the *Lingula tumidula* differs materially, both in size and composition, from that of any of the previously known species; it is considerably larger and thinner, and rather horny than calcareous, and the colour of it is a burnt olive-red. From the swollen appearance of the valves I am inclined to think that the shell is perfectly pliable and elastic during the life of the animal.

LINGULA COMPRESSA. *Ling. testâ corned, tenuissimâ, valdè compressâ, fusco-olivaceâ, subquadrato-ovali, versus apicem attenuatâ, umbonibus depressis, indistinctis; valvis utrinque clausis.*

Hab. ad Palanam, ins. Masbate, Philippinarum.

Long. $1\frac{8}{10}$; lat. $1\frac{1}{10}$ poll.

“This curious species was found by Mr. Cuming in sandy mud at low water at Palanas, Island of Masbate, one of the Philippines. Its shell is of the same thin horny composition as that of the *Lingula tumidula*; in fact I at first took it to be merely a local variety of that species. Upon comparison however I feel assured that it is distinct; it is more attenuated towards the apex, and from the valves being remarkably compressed and closely united all round, I am induced to suppose that the animal must be proportionably smaller. The two specimens from which the above description is drawn do not exhibit the pallial cilia, which Mr. Cuming’s usual care would have protected; they may therefore not have been exerted beyond the margin of the valves. He did not succeed in obtaining the pedicle of this species.

“Mr. Cuming exhibits on this occasion specimens of all the known *Lingulæ* from his own collection, and I am not aware that four species out of the seven exist in any other. They belong to a class of mollusks of which few recent varieties are known, and may therefore be highly esteemed for their conchological interest.”

The next paper read was from Mr. G. B. Sowerby, jun., and is entitled “Descriptions of nine species of the genus *Pupina*.”

Gen. PUPINA, Vignard.

Molluscum terrestre.

Testa subcylindrica, vitrea, nitidissima, anfractibus quinque ad sex, penultimo inflato, ultimo paululùm coarctato; aperturâ circulari, margine crasso, reflexo, ad basin columellæ inciso, vel emarginato.

Operculum corneum, spirale.

The glassy enamel, which gives a brilliant polish to the small, terrestrial shells composing this genus, seems to distinguish them even from those species of *Cyclostoma* which most nearly resemble them, in having a pupiform shape, and a notch at the base of the columella. The question has been asked, "Why not make this marginal notch the criterion of the genus?" The answer is found in the following facts: first, the notch is found in *Cyclostomata*, which have no other character in common with *Pupinæ*; second, that several *Cyclostomata* have a canal at the lower part of the whorl, which if continued would form a similar notch; third, that our *Pupina lubrica*, which could scarcely be separated from the genus, has but a very slight emargination.

The first species described under this generic name was *P. Keraudrenii*, published by Vignard in the 'Annales des Sciences,' 1829.

Mr. Grateloup subsequently described *P. Nunezii* under the generic name *Moulinisia*, neither of these naturalists being acquainted with the operculum.

All the species here described, with the exception of *P. antiquata* and *P. Keraudrenii*, were recently brought to this country by Mr. Cuming from the Philippines.

* Species spirâ axe retrorso.

PUPINA NUNEZII. *Moulinisia Nunezii*, Grateloup, Ann. Soc. Linn. Bordeaux, 1840. *P. Nunezii*, Sow. jun., Thesaurus Conchyliorum, part 1. f. 8, 9, 10, 11. Published May 1842. *Testa globosa, obliqua; aperturâ magnâ, margine validè expanso, reflexo, complanato, incisurâ triangulari penitùs diviso; labio columellari concavo: anfractu ultimo propè aperturam subcomplanato.*

Long. .50; lat. .35 poll.

Hab. ad insulas Samar, Luzon, Catanduanus et Siquijor, Philippinarum.

Var. *a.* *Fusca margine flavido.* Samar.

Var. *b.* *Flavida, margine aurantiaco.* Albay, ins. Luzon.

Var. *c.* *Fulva rufescens.* Ins. Catanduanus.

Var. *d.* *Alba, propè aperturam purpureo-cincta, margine flavido.*
Ins. Leyte.

More globose than any other species, the spire turned backwards, the penultimate whorl elevated, the last whorl flattened in front, the incision of the peritreme deep, the columella grooved, varying in colour from bright orange to cream-white and dark brown; the margin always either orange or yellow. Found on leaves of small plants and low bushes in several of the Philippine Islands.

PUPINA PELLUCIDA, Sow. jun., Thesaurus Conch. part 1. f. 18, 19, 20. *Testa obliqua, subglobosa, pellucida, spiræ axe valdè retrorso, anfractu penultimo elevato, ultimo complanato margine reflexo, incisurâ diviso; columellâ latâ convexâ.*

Long. .30; lat. .20 poll.

Hab. ad insulas Luzon et Zebu, Philippinarum.

Var. *a.* *Fulva.* Daleguete, ins. Zebu.

Var. *b.* *Grisea fulvescens, minor.* Bongabon, ins. Luzon.

Smaller, more transparent, and with the spire more bent than the last; the outer lip less expanded, the notch completely dividing the peritreme, and the columella convex. Found on small plants in woods.

* * Spirâ penè rectâ.

PUPINA LUBRICA, Sow. jun., Thesaurus Conch. part 1. f. 12 to 16.

Testa subobliqua, cylindrica; spirâ brevi obtusâ, aperturâ rotundatâ; margine anticè subexpanso, paululùm incrassato, ad basin columellæ vix emarginato; columellâ callosâ.

Long. .35; lat. .25 poll.

Hab. ad insulas Panay, Siquijor, et Luzon, Philippinarum.

Var. *a.* *Fulva.* Ins. Panay.

Var. *b.* *Fulva, minor.* Ins. Siquijor.

Var. *c.* *Alba, translucida.* Ins. Siquijor.

Var. *d.* *Grisea fulvescens.* Ins. Luzon.

Var. *e.* *Alba.* Calauang, Laguna, ins. Luzon.

In this species the notch is scarcely perceptible, and there is a rounded callosity behind the columellar lip. The inner lip is thickened on the body whorl. Found in dense woods on small plants.

PUPINA VITREA, Sow. jun., Thes. Conch. part 1. f. 6, 7. *T. subelongata, recta, anfractibus subrotundatis, margine expanso, reflexo, complanato, incisurâ diviso.*

Long. .50; lat. .25 poll.

Hab. Ins. Mindinao et Luzon, Philippinarum.

Var. *a.* *Fulva, margine luteo.* Albay, ins. Luzon.

Var. *b.* *Fulva, margine aurantiaco.* Cagayan, pr. Misamis, ins. Mindinao.

The spire is straight and elevated, gradually tapering towards the obtuse apex; the peritreme is expanded and flattened, the notch deep.

PUPINA SIMILIS, Sow. jun., Thes. Conch. part 1. f. 4, 5. *Testa fulva, subelongata, recta, anfractibus subrotundatis, margine pallidè fulvo, expanso, reflexo, rotundato, crasso, incisurâ usque ad dorsum diviso.*

Long. .45; lat. .26 poll.

Hab. Bolino, provinciam Zambales, ins. Luzon.

Resembling *P. vitrea*, but the margin not flattened, and the notch so deep that it is seen at the back of the shell. Found on leaves of bushes and trunks of trees in the island of Luzon.

PUPINA EXIGUA, Sow. jun., Thes. Conch. f. 17. *Testa parva, translucida, alba, cylindrica; anfractu penultimo inflato; margine aperturæ paululùm incrassato, incisurâ diviso.*

Long. .26; lat. .16 poll.

Hab. St. Nicholas, ins. Zebu, Philippinarum.

This small, transparent white species has the margin very little thickened, and the notch deep. Found on small plants.

*** Spirâ rectâ, aperturâ bicanaliculatâ.

PUPINA HUMILIS, Jaquetot, Sow. jun., Thes. Conch. part 1. f. 2.

Testa ovalis, solida, pallidè lutea, anfractibus subrotundatis, ultimo propè aperturam paululùm complanato; aperturá rotundatá, margine crasso, expanso, reflexo; labio interno crasso, posticè plicato; columellá crassá, latá, tortuosá, reflexá; incisurá ad dorsum latá.

Long. .60; lat. .40 poll.

Hab. — ? Mus. Cuming.

This being a dead shell has lost the brilliancy of the enamel. The teeth or folds at the posterior part of the inner and outer lips form a very distinct canal. The columella is tortuous and turned backwards, and the notch is seen at the back like the canal of a *Buccinum*.

PUPINA KERAUDRENI, Vignard, Sow. jun., *Thes. Conch.* part 1. f. 2.

Testa parva, cylindrica, griseo-rufescens; spirá obtusá rectá; aperturá parvâ, margine incisurá diviso; labio externo levitèr incrassato, posticè subplicato; labio interno plicato.

Long. .30; lat. .15 poll.

Hab. Manilla and Singapore? Mus. Stainforth, Sowerby.

A pupiform species with a posterior canal.

PUPINA BICANALICULATA, Sow. jun., *Thes. Conch.* part 1. fig. 1.

Testa parva, ovalis, alba, translucida; anfractibus ventricosis; aperturá magnâ, margine subexpanso, subincrassato, ad basin columellæ inciso; labio interno posticè plicato.

Long. .26; lat. .16 poll.

Hab. St. Nicholas, ins. Zebu, Philippinarum.

This species differs from *P. Keraudrenii* in shape, being more ventricose, having a tapering spire, and a very strong fold on the inner lip. Found on small plants in the island of Zebu.

The following paper, entitled "Descriptions of four species of the genus *Chiton*, brought by H. Cuming, Esq. from the Philippine Islands," also by Mr. G. B. Sowerby, jun., was then read:—

CHITON PULCHERRIMUS. *Ch. Testá ovali, angulatá, ad dorsum elevatá, pallidè subviridi, fasciis binis rubris distantibus dorsalibus, maculis rubris dorsalibus et lateralibus nonnullis intus viridi; areis centralibus longitudinaliter foveolatim sulcatis; areis lateralibus prominentibus, utrinque granulatim tricostatis; areis terminalibus costis moniliformibus numerosis radiatis; margine minutè squamoso, maculis rubris fasciato.*

Long. .95; lat. .55 poll.

Hab. Gindulman, ins. Bohol, Philippinarum. H. Cuming legit.

The few specimens of this shell which have been brought in fine condition present an appearance of exquisite finish and great beauty, both in sculpture and colouring. They were found in the crevices of rocks at low water.

CHITON LAQUEATUS. *Ch. testá ovatá, depressá, granulatá, pallidè fulvá vel viridescente, purpureo et viridi maculatá; costá dorsali purpureá, sublævi; valvá primá costis quinque laqueatá; valvis medianis unicastatis ad latera quadratis; valvá ultimá valdè de-*

pressâ, margine lato, irregulariter rugoso, rubro, viridi, alboque maculato. Variat testâ angustiore, margine rosedâ.

Long. .55; lat. .45 poll.

Hab. Calapan, ins. Mindoro, Philippinarum. H. Cuming legit.

Remarkable for the character of the first valve, which is broadly fluted by five radiating ribs. The four or five central valves, in several specimens, are nearly covered by a dark purple colour, the two last patched with green, and the first nearly white, but subject to some variations. Found in coarse sand among small stones at a depth of nine fathoms.

CHITON FLOCCATUS. *Ch. testâ ovali depressâ, anticè angustatâ, pallidè fulvâ; nigro, fusco, viridi, roseoque maculatâ: valvis terminalibus radiatim sulcatis, valvis medianis utrinque unicos-tatis, areis centralibus longitudinaliter sulcatis; areis lateralibus granulatis, marginibus serratis; valvâ terminali obtusè elevatâ; margine rubro vel fusco, maculis et punctis albis fasciato.*

Long. .80; lat. .45 poll.

Hab. Cagayan, Misamis, ins. Mindinao, Philippinarum. H. Cuming legit.

This species is found at Mindinao, under stones at low water, and at Calapan on small stones, at a depth of fifteen fathoms. The margin is sprinkled with white patches resembling flakes of snow, on a reddish brown ground.

CHITON LUZONICUS. *Ch. testâ ovali, angulatâ, stramineâ, viridi longitudinaliter strigatâ: valvarum areis terminalibus et lateralibus radiatim granulatis; areis centralibus acutè longitudinaliter sulcatis, margine sublevi.*

Long. .35; lat. .20 poll.

Hab. Sorsogon, pr. Albay, ins. Luzon, Philippinarum. H. Cuming legit.

This small and apparently insignificant shell is very sharply ribbed in the central areas, and presents a very nicely sculptured surface when viewed through a magnifying glass. The specimens were taken on dead shells at a depth of fifteen fathoms.

Mr. Waterhouse next proceeded to characterize the following new species of *Curculionidæ* from the collections of Mr. Darwin and Mr. Bridges.

Divisio CLEONIDES, Schoenherr.

GENUS LISTRODERES, Scho.

LISTRODERES SUBCOSTATUS. *Listr. niger, opacus, fusco-squamosus; antennis piceis; rostro brevi, carinato; thorace punctatissimo, subquadrato, posticè angustiore, setis fuscis instructo; elytris punctato-striatis, fusco-setosis, interstitiis alternatis subelevatis.*

Long. corp. et rostri, 6 lin.; lat. $2\frac{1}{4}$ lin.; long. $4\frac{3}{4}$, lat. 2 lin.

Hab. Valleys of Petorca.

Rostrum about half as long again as the head, with three costæ above, the central one but little developed, and the lateral costæ indistinct; the space between the costæ finely rugose; the whole sur-

face of the rostrum covered with distinct yellowish hairs. Head thickly punctured, the punctures confluent, and with an impressed point between the eyes. Thorax about one-third broader than long, emarginated in front, nearly straight behind, but slightly indented in the middle; the broadest part of the thorax is about the anterior third; from this point it is contracted in width, both before and behind, in nearly equal proportions; the upper surface is nearly flat, and very thickly and distinctly punctured; the punctures more or less confluent; a faint dorsal ridge is sometimes perceptible; small spiny semierect hairs cover the thorax; elytra moderately long, with the humeral angles forming right angles; the apex rounded, the width about one-fourth greater than that of the thorax; the upper surface moderately convex, covered with brown scales, and having interspersed erect spiny hairs; punctate-striated, the interstices very finely shagreened; the third, fifth, and the seventh from the suture, raised; a few black spots are irregularly scattered over the elytra, and in some specimens are some whitish spots arranged in lines on the apical portion of the elytra.

From the collection of Mr. Bridges.

LISTRODERES PILOSUS. *Listr. niger, opacus, setosus, fusco-squamosus; antennis tarsisque fusciscentibus; rostro indistinctissimè carinato; thorace crebrè punctato, subquadrato, lateribus subrotundatis; elytris punctato-striatis. Capite, thorace, elytrisque squamis fuscis atque nigrescentibus densè tectis.*

Long. corp. et rostri, $3\frac{1}{3}$ lin.; lat. $1\frac{1}{4}$ lin.

Hab. Valleys of Petorca.

About equal in size to *Sitona fusca*. Rostrum a trifle longer than the head, slightly rugose, and with a very indistinct longitudinal carina. Head thickly punctured, the punctures confluent, and an impressed line between the eyes. Thorax subquadrate, and somewhat depressed; very thickly, but not coarsely punctured, the punctures confluent; the width greater than the length; the sides nearly straight and parallel, excepting near the base and apex of the thorax, where the width is gradually contracted. Elytra but little wider than the thorax, somewhat convex and elongated; the humeral angles rounded, and the apical portion rather attenuated, but with the tip rounded; the sides subparallel; punctate-striated; the punctures, of moderate size, are rather close together; the interstices of the striæ nearly flat, and apparently slightly rugose.

The sculpturing of the rostrum, head, thorax and elytra is with difficulty examined, all these parts being densely clothed with scales; these are chiefly of a brown colour, but in parts they are of a blackish hue. On the thorax is an indistinct dusky line in the middle, and one or two dusky patches at the sides; the elytra are variegated with deep and pale brown.

From the collection of Mr. Bridges.

Listroderes costirostris, Scho. Several specimens of this species are contained in Mr. Darwin's collection, having been collected at Maldonado; and there are, moreover, specimens collected at Coquimbo which present no distinguishing character, excepting in being

of a larger size, viz. total length $5\frac{1}{2}$ lines, width $2\frac{1}{4}$ lin.; those from Maldonado being $4\frac{1}{2}$ lines in length and $1\frac{3}{4}$ in width.

LISTRODERES ROBUSTUS. *Listr. breviter ovatus, niger, opacus, fusco-squamosus, setosus; antennis fusciscentibus; rostro longiusculo, carinato, pilis minutis decumbentibus tecto; thorace crebrè punctulato, brevi, vittâ albâ ornato, lateribus subrotundatis; elytris breviter ovatis, punctato-striatis, fasciâ albescente, ad latera interruptâ, ornatis, singulatim tuberculo subapicali instructis.*

Long. corp. et rostri, $4\frac{1}{3}$ lin.; lat. $2\frac{1}{2}$ lin.

Hab. Coquimbo.

In size and form this species may be compared to the *Phytonomus punctatus*. Rostrum about twice as long as the head, covered with minute decumbent brownish hairs, and with a longitudinal carina. Thorax rather broader than long, very suddenly contracted in front, and broadest near the fore-part; the sides slightly rounded, or nearly straight; the posterior angles rounded, and the posterior margin indistinctly produced in the middle; the surface very thickly punctured and covered with pale brownish scales, and having interspersed minute hairs; in parts the scales assume a deeper hue, and in the middle is a whitish line. Elytra about one-third broader than the thorax, convex, and of a short ovate form; punctate-striated; the interstices obscurely punctured, and slightly convex; they are covered with brownish scales, and have interspersed minute pale hairs; rather behind the middle is a broadish curved mark, which is obliterated on the sides of the elytra; and towards the apex is a small angular tubercle.

From the collection of Mr. Darwin.

LISTRODERES APICALIS. *Listr. squamosus, fusco-albescens; antennis piceis; rostro carinâ longitudinali fuscâ; capite notis duabus fuscis anticè convergentibus; thorace anticè quam posticè latiore, ad latera ferè recto, anticè foveâ incurvatâ, lined albâ longitudinali; elytris thorace duplo latioribus, punctato-striatis; singulis notâ nigrescente obliquâ, ad apicem albescente, tuberculo distincto subapicali.*

Long. corp. et rostri, $3\frac{1}{4}$; lat. $1\frac{1}{3}$ lin.

Hab. Monte Video.

This species is considerably less than the *L. costirostris*, being about equal in size to the *Phytonomus rumicis*. The rostrum is rather slender, nearly twice as long as the head, covered with minute decumbent hairs, which are of a whitish brown colour; in the middle is a longitudinal carina. The thorax is broader than long; the broadest part is considerably in front of the middle; in front it becomes somewhat suddenly contracted; the sides of the thorax converge from near the anterior part towards the base, and are nearly parallel; the posterior margin is slightly rounded, being produced in the middle; the hinder angles are obtuse; the upper surface of the thorax is nearly plane, presenting scarcely any convexity, and in the fore-part is a curved impression, the extremities of which lead up to the anterior angles; it is densely clothed with scales, and these are of a very

pale brownish colour; in parts the scales are of a deep brown colour, and in the middle is a longitudinal line, formed of whitish scales; besides the scales are some very minute, semierect, scattered dusky hairs; the sculpturing cannot well be seen, owing to the covering of scales, but the thorax appears to be very thickly though not coarsely punctured. The elytra are oblong, about one-third broader than the thorax; the humeral angles are prominent and rounded; the sides nearly straight, and the apex rounded; the surface is convex, but somewhat depressed at the basal portion of the elytra; punctate-striated; covered with pale brownish scales, having moreover some very minute scattered spines; the third and fifth interstices of the striæ on each elytron are slightly raised; rather behind the middle is an oblique deep brown patch, behind which the scales are white, or nearly so; a distinct angular tubercle is observable on each elytron, at a short distance from the apex. The legs and antennæ are brown, and covered with minute palish hairs; near the apex of each of the femora is a whitish ring.

In the collection of Mr. Bridges are several species of *Curculionidæ* closely allied to *Listroderes*, but differing in having the antennæ more slender and elongated; the club is very long, distinctly jointed, and very slightly incrassated; the legs are longer, and the body is covered with minute hairs, or hair-like scales, whilst all the species of *Listroderes* examined by me have the body distinctly clothed with scales. Moreover, in none of the insects under consideration do I find the tubercles on the apical portion of the elytra, which are so common in the *Listroderes*. Such differences, though readily seen, it is impossible to express by a generic term. I have determined to designate this new genus by the name

ADIORISTUS*, nov. gen.

Antennæ longæ, tenues; scapus ad apicem subincrassatus; articuli funiculi obconici, 1° longo; clava elongata distinctè triarticulata.

Rostrum capite ferè duplo longius, crassiusculum, subarcuatum, versus apicem incrassatum, suprâ carinatum: mandibulæ tenues paulo elongatæ.

Oculi subovati, subdepressi.

Thorax transversus, ponè oculos lobatus, suprâ subdepressus.

Elytra elongato-ovata, convexa, ad apicem rotundata.

Tarsi elongati, subtenuis, subtùs spongiosi.

ADIORISTUS PUNCTULATUS. *Ad. niger, fusco-pilosus; antennis, tibiis tarsisque piceis; rostro brevi, crasso, carinato; thorace punctulato, brevi subquadrato, anticè angustiori, posticè utrinque subemarginato; elytris oblongo-ovatis, convexis, punctato-striatis, interstitiis alternatis maculis parvulis nigris atque albescentibus ornatis.*

Long. corp. et rostri, $6\frac{1}{3}$ — $8\frac{2}{3}$ lin.; lat. $2\frac{1}{2}$ — $3\frac{1}{3}$ lin.

Hab. Valleys of Petorca.

The whole insect is covered with minute decumbent hairs, and these are of an ashy-brown colour. The rostrum is stout, considerably dilated at the apex, and about twice as long as the head;

* From ἀδιόριστος, undefined, &c.

rugose, and has fine longitudinal keels on the upper surface, of which the central one is most strongly developed, and the one next it on each side indistinct. The head is convex above, and thickly punctured. The thorax is about one-third broader than long; the anterior margin is straight, and the lateral margins are very nearly straight; the anterior part is rather narrower than the hinder part; the hinder margin is in the form of a segment of a circle, being produced in the middle, and joins the lateral margin so as to form a somewhat salient but obtuse angle; the upper surface is but very slightly convex, and thickly and distinctly punctured. The elytra are convex, and of an elongate-ovate form, and scarcely one-third broader than the thorax; the upper surface is densely clothed with minute hairs; punctate-striated, the punctures not very large, and distinctly separated; the interstices are plane, or indistinctly convex, and are very finely punctured. On each stria is a series of small black and whitish spots, and these most of them are oblong.

ADIORISTUS ANGUSTATUS. *Ad. niger, fusco-pilosus; antennis, tibiis tarsisque fusciscentibus; rostro brevi, crasso, carinato; thorace punctulato ad latera et posticè subrotundato; elytris thorace paulò latioribus, elongatis, subovatis, punctato-striatis, maculis parvulis nigris ornatis.*

Long. corp. et rostri, $5\frac{1}{2}$ lin.; lat. 2 lin.

Hab. Valleys of Petorca.

This species closely resembles the last in many respects, and especially in its colouring, and in being covered with minute ashy-brown decumbent hairs, but it is of a narrower and more elongated form, and of a much smaller size.

The rostrum is about half as long again as the head, rugose, and has three parallel keels on the upper surface, of which the central one is the most prominent. The head is thickly punctured. The thorax is scarcely one-third broader than long, slightly emarginated in front; the sides are nearly straight and parallel, but near the anterior part they gradually converge, so as slightly to contract the width of the thorax at this part; about the posterior third of the thorax the sides also converge towards the posterior margin, so that the thorax may be described as obliquely truncated on each side behind: the posterior margin is straight; the upper surface is nearly flat, and thickly and distinctly punctured. The elytra are moderately convex and of an elongated ovate form, and about half as broad again as the thorax; punctate-striated, the punctures of moderate size and distinctly separated, excepting on the hinder part of the elytra; they are densely clothed with decumbent ashy-brown hairs, and on each stria is a series of oblong blackish spots; the interstices are very delicately but thickly punctured.

ADIORISTUS CONSPERSUS. *Ad. niger, subopacus, fusco-pilosus; antennis tarsisque fusciscentibus; rostro brevi, crasso, carinato; thorace punctatissimo, subquadrato, posticè paulò angustiore, modicè convexo, lateribus subrotundatis; elytris quoad latitudinem thorace ferè coequalibus, lateribus subparallelis, punctato-striatis, interstitiis planis.*

Long. corp. et rostri, $5\frac{1}{2}$ lin. ; lat. $2\frac{1}{4}$ lin.

Hab. Valleys of Petorca.

Rostrum about half as long again as the head, much dilated at the apex, with three distinct carinæ, and the two outer carinæ converging slightly towards the base of the rostrum; between the carinæ are minute longitudinal rugæ, but these are hidden by the numerous small brownish hairs which cover this and other parts of the insect. The head is thickly punctured, and there is a minute oblong depression between the eyes. The thorax is subquadrate, about one-fourth broader than long; the anterior margin is straight; the sides are slightly rounded, but nearly straight towards the hinder part of the thorax; the greatest width is at the anterior third; the posterior margin is straight, and the posterior angles are very nearly right angles; the upper surface is nearly flat, being but very slightly convex, and thickly but rather finely punctured. The elytra are moderately elongated, but little broader than the thorax, and moderately convex above; the sides are nearly parallel, being very little dilated in the middle; the apical portion is rounded; they are punctate-striated, and the interstices are finely punctured; a series of small blackish spots is observable on each of the striæ; on other parts the very minute hairs which cover the elytra are brownish.

ADIORISTUS SIMPLEX. *Ad. piceo-niger, pilis fuscescentibus tectus; antennis piceis; rostro brevi, carinato, ad basin transversim impresso; thorace rugoso-punctato, subcylindraceo, lateribus paulò rotundatis; elytris oblongo-ovatis, punctato-striatis, punctis aliquantò profundis, interstitiis ferè planis et punctulatis.*

Long. corp. et rostri, $3\frac{3}{4}$ lin. ; lat. $1\frac{1}{2}$ lin.

Hab. Valleys of Petorca.

A small species, about equal in size to *Phyllobius alneti*. The rostrum short and stout, being but little longer than the head, is furnished with a central carina and a carina on each side, which is less distinct, and the space between these ridges has longitudinal rugæ, which are partially hidden by the scattered hairs which cover this and all other parts of the body. The head is thickly punctured, and the punctures are confluent; a small oblong impression is observable between the eyes, and in front of the eyes is a transverse depression, separating, as it were, the rostrum from the head. The thorax is nearly cylindrical, broader than long, and slightly narrower behind than near the fore-part; the anterior and posterior margins are straight; the upper surface is thickly and rather coarsely punctured, and the punctures are many of them confluent. The elytra are of an elongated ovate form, convex, somewhat attenuated, but rounded at the apex; punctate-striated, the punctures moderately large and rather deep, and nearly joining each other; the interspaces between the striæ are nearly plane, indistinctly punctured in parts and slightly rugose; the minute but somewhat spiny hairs which cover the elytra are not sufficiently abundant to hide the sculpturing, and are semi-erect.

A species of the present genus is contained in Mr. Darwin's collection, which differs from either of the above: it is almost destitute

of the small hairs which give the brownish colouring to the other species here described.

ADIORISTUS SUBDENUDATUS. *Ad. oblongus, niger, pilis minutissimis atque squamulis albescentibus adspersus; antennis tarsisque fusciscentibus; rostro carinato, punctulato; capite inter oculos transversim impresso, crebrè punctulato; thorace subcylindraceo in medium paulò dilatato, punctis minutis impresso; elytris oblongo-ovatis, punctato-striatis, interstitiis paulò convexis, obsoletè punctulatis.*

Long. corp. et rostri, $6\frac{1}{2}$ lin.; lat. $2\frac{1}{2}$ lin.

Hab. Mendoza.

This insect is intermediate in size between the *Ad. punctulatus* and *Ad. angustatus*, and is readily distinguished from either of the species here described by its denuded appearance; the scales and hairs, which are sparingly scattered over the body, only become visible with the assistance of a moderately strong lens.

The rostrum is about twice as long as the head, very thickly though finely punctured, and the punctures are confluent; in the middle is a distinct carina. The head is separated from the rostrum by a transverse and somewhat shallow depression, and in the middle of this depression is a small fovea: the upper surface of the head, as well as the thorax, is very thickly and finely punctured, and the punctures are confluent. The thorax is rather broader than long, subcylindrical, truncated before and behind; the upper surface is slightly convex, and the sides are somewhat rounded, being slightly dilated a little in front of the middle. The elytra are of an elongate-oval form, moderately convex, somewhat attenuated at the apex, but with that part rounded; they are distinctly punctate-striated; the punctures are arranged closely together, and the interstices of the striæ are narrow, slightly convex, and very delicately punctured.

Cylydrorhinus angulatus.—Under this name M. Guerin-Meneville describes, in the 'Revue Zoologique' (No. 7, 1841, p. 217), a species of *Curculio*, from Port Famine, which I am inclined to regard as specifically identical with specimens brought by Mr. Darwin from St. Cruz and St. Julian.

M. Guerin states that the elytra are covered above with large deep punctures arranged in longitudinal striæ, at the base of each of which is a very small tubercle, and which are united together by an indistinct transverse impression.

In the specimens brought by Mr. Darwin, the elytra are deeply punctate-striate at the base, but from the base towards the apex the punctures gradually decrease in size; the minute tubercles are situated on the anterior margin of each puncture, and in addition to the striæ of punctures, the elytra are for the most part covered with somewhat irregular transverse rugæ; these are most distinct on the sides of the elytra (or rather what appears to be the side, for the elytra are strongly keeled at some little distance from the lateral margin, so that that part is hidden as we view the insect from above), less distinct on the apical portion, and do not extend to the disc. The apical portion of each elytron is slightly produced, and the

elytra appear as if were terminated by a tubercle; near the apex, on each side, is another tubercle. The thorax has a distinct fovea on each side, in the middle and near the lateral margin. The size of the specimens from Port St. Cruz varies from length $9\frac{1}{2}$ lin., width $4\frac{1}{3}$ lin., to length $7\frac{3}{4}$ lin., width $3\frac{1}{3}$ lin.

A specimen from St. Julian differs in being considerably smaller and more deeply sculptured, and in having a small patch of white scales near the apex of the elytra; the interstice between the fourth and fifth striæ is somewhat raised. Length 7 lines.

In the collection is a specimen, without label, which agrees with this variety, as I presume it is. Length $6\frac{1}{2}$ lines.

Two out of three specimens from St. Cruz have pitchy red colour legs; in the third the legs are black. The specimen from St. Julian has also black legs.

Mr. Darwin found this *Curculio* "lying dead by thousands on all parts of the plains at St. Julian, both far in the interior and near the coast."

MICROSCOPICAL SOCIETY.

At a meeting of the Microscopical Society held October 19th, 1842, J. S. Bowerbank, Esq., in the Chair, a paper was read by William B. Carpenter, M.D., "On the Structure of the Animal Basis of the common Egg-shell, and of the Membrane surrounding the Albumen." The author found on examining the thin membrane surrounding the albumen of the hen's egg (*membrana putaminis*) that it consisted of several laminæ, each lamina being composed of interlacing fibres, between which numerous interspaces are left; on comparing this with a portion of egg-shell decalcified by means of dilute acid, both presented the same structure, but the laminæ were more numerous in the latter; he supposes that the deposit of calcareous matter takes place in the interspaces left by the reticulation of the fibres, and concludes that this fibrous membrane is analogous to the chorion of Mammalia. A preparation showing the identity of the two structures accompanied the paper.

Another paper was also read by Arthur Hill Hassall, Esq., entitled "An Explanation of the Cause of the Rapid Decay of many Fruits, more especially of those of the Apple tribe." After some preliminary observations, the author proceeded to state, that on placing a portion of decayed apple under the microscope, he observed vast numbers of ramified filaments passing in all directions between and around the cells of the parenchyma of the fruit; these filaments were regarded as those of a minute fungus or fungi*, which by insinuating themselves between the cells of the pulp of the fruit, detached them from their connections with each other, destroyed their vitality, and ultimately produced a decomposition of their contents.

* Complete observations on this interesting subject have been made known by Prof. Ehrenberg so far back as 1820 in the 'Regensburger Flora,' ii. p. 535, and more fully in the 'Nova Acta Nat. Cur.' vol. x., under the title *De Mycetogenesi Epistola*.—ED. ANV.

The author then gives his reasons for supposing the fungi to be the cause and not the effect of the decay; and concludes by describing the several stages of development of the fungi, and their mode of entrance within the fruit. Specimens of the fungi were exhibited to the Society after the reading of the paper.

GEOLOGICAL SOCIETY.

Nov. 17, 1841.—A letter addressed to Dr. Fitton, by Mr. Lyell, and dated Boston the 15th of October, 1841, was read.

Mr. Lyell's attention, between the period of his arrival in the United States and the date of his letter, had been principally devoted to the grand succession of Silurian, Devonian, and Carboniferous strata in the state of New York and on the borders of Pennsylvania, having been accompanied during a portion of his tour by the States' Geologist, Mr. J. Hall; but he had also visited, in company with that gentleman, the Falls of Niagara and the adjacent district, and he states, that he purposes to communicate a paper on the phenomena of the recession, drawn from new arguments, founded on the position of a fluviatile deposit below the Cataract. He expresses his intention of also communicating a notice of five localities of Mastodon bones which he had visited, digging up some remains himself, and collecting the accompanying shells, which he says, seem to have been neglected. He had likewise examined, accompanied by Prof. Silliman and his son, the new red, with intrusive trap, in Connecticut; and, assisted by Mr. Conrad, he had collected fossils in every member of the cretaceous system in New Jersey*. The principal object, however, of the present communication is, to point out the extension to the United States of Mr. Logan's generalizations on the beds of fire-clay containing *Stigmæria*, formerly laid before the Society in a paper on the coal-field of South Wales. Mr. Lyell had met Mr. Logan at New York, previously to that gentleman's visit to the anthracite coal-field of Pennsylvania, and he adverts to the delight which Mr. Logan must have felt in witnessing the occurrence of beds of *Stigmæria* fire-clay to an extent far exceeding what could have been expected. On the confines of the states of New York and Pennsylvania, Mr. Lyell found remains of *Holoptychius* and other fishes in the old red sandstone, and at the bottom of the overlying coal series a thick quartzose conglomerate; and he says that the coal-measures, with their imbedded plants, bear an exact analogy to British coal-measures, both in detail and as a whole. In investigating the coal district of Blossberg, Mr. Lyell had for a guide Dr. Saynisch, president of the mines. The first point which they examined presented three seams of bituminous coal resting on fire-clay containing *Stigmæriæ*, with the leaves

* Mr. Lyell mentions incidentally having observed between Easton and Trenton, on the Delaware, and in 40° of north latitude, that all the trees were barked on one side, at the height of twenty-two feet above the present level of the river, owing to a freshet and stoppage by ice in the spring of 1841. The stuccoed parts of the houses were also strangely scraped; and in one place the canal, the towing-path of which is twenty-two feet above the river, was so filled with gravel that carriages did not cross by the bridges.

attached to the stems, and extending in all directions through the clay; and they observed, in a gallery lighted on purpose, that the stems seen *in situ* were very nearly all parallel to the planes of stratification, only one being in an oblique position. Every stratum underlying a coal-seam examined by Mr. Lyell, presented the same phenomena, except one, and in that case the bed was so sandy that it could not be considered as a fire-clay. The thickness of these Stigmaria deposits varied from one foot to six feet. The roof of the Blossberg coal-seams consists usually of bituminous slates, but occasionally of very micaceous grit, and it contains great varieties of ferns, as well as other plants, agreeing, generically at least, with those common in the British coal-measures.

Mr. Lyell next examined the anthracitic coal-district at Pottsville, on the Schuylkill, in the southern part of the Alleghanies. This district had been examined and described, as well as modelled, by Mr. R. C. Taylor, and the model had been inspected by Mr. Lyell previously to his visit. The whole of Pennsylvania has been mapped by Prof. H. D. Rogers, by direction of the State Legislature. Mr. Lyell refers to this survey, and he states that, by consulting Prof. Rogers's map, it will be found that the Alleghanies, or more properly the Appalachians, which, viewed geologically, are 120 miles broad, consist of twelve or more great parallel ridges, or anticlinal and synclinal flexures, having a general north-north-east and south-south-west strike, but in Pennsylvania a nearly east and west strike prevails. The strata are most tilted on the southern border of the chain, where their position is often inverted, and the folds become less and less towards the central ridges and troughs, which again increase in breadth the more northward their position, till at last the beds are almost horizontal. The oldest formations also are chiefly exposed in the most southern or disturbed regions, where syenite and other plutonic rocks are intruded into the lower part of the Silurian series. It has long been observed, that the anthracitic coal is confined to the southern or Atlantic side of this assemblage of small parallel chains, and that the bituminous occurs in the more inland or less disturbed region; the conclusion, therefore, Mr. Lyell states, seems inevitable, that the change in the condition of the coal was a concomitant of the folding and upheaval of the rocks. The conversion, moreover, is most complete where the beds have been most disturbed; and there are tracts in Pennsylvania and Virginia, near the centre of the chain, where the coal is in a semi-bituminous state. Chemical analysis, likewise, has shown that a gradation from the most bituminous to the most anthracitic coal may be found in crossing the chain from north to south*. The associated shales, &c., of the disturbed regions exhibit no alterations.

It has also been supposed that the anthracite belonged to the transition, and the bituminous coal to the secondary period; but this belief, Mr. Lyell says, has been gradually abandoned, as the knowledge of the geological position and the fossil plants of the coal-districts have become better known. Both the anthracitic and the bituminous

* See papers by Prof. H. D. Rogers, Dr. Silliman, &c.

coal overlies the old red sandstone, and contain the same ferns, *Sigillariæ*, *Stigmaria*, *Asterophyllites*, &c.; and they are as abundant and perfect in the anthracite as in the bituminous coal.

At the first point where Mr. Lyell, accompanied by Prof. Rogers, examined the Pottsville coal-measures, the strata are nearly vertical, being cut off by a great fault from the less inclined beds which form the northern prolongation of the measures. They present thirteen beds of anthracite, the lowest of which alternate with the uppermost strata of the coarse underlying conglomerate. The southern wall of an excavation from which the coal had been removed, and which wall occupied the place of the underclay, presented impressions of the stems and leaves of *Stigmaria*; and on the more solid and slaty beds of the opposite wall, or original roof, there were leaves of *Pecopteris*, reed-like impressions, and *Calamites*. In the slightly inclined northern continuation of the coal-measures, Mr. Lyell observed in the Peachmount vein, three miles north-east of Pottsville, a bed of anthracite eight feet thick, overlaid by the usual roof of grey grit, and underlaid by blue clay or shale with *Stigmaria*. Impressions of ferns were likewise noticed in the coal itself. Only one instance was met with in the Pottsville coal-district, by Mr. Lyell and Prof. Rogers, of a *Stigmaria*, placed at right angles to the plane of stratification.

The Pottsville, or southern anthracitic coal-field of Pennsylvania was illustrated by a section resulting from the former labours of Prof. Rogers, under whose guidance Mr. Lyell examined the country. The following remarks may explain the general structure of the country; the names applied to the formations are not, however, those previously employed by the American geologists, but those suggested by Mr. Lyell, in conformity with the conclusions at which he arrived after his tour in New York, and a comparison of the strata of that state with their British equivalents. The contrast between the relative importance of most of the Silurian and Devonian groups in Pennsylvania and in New York, Mr. Lyell states, is very great, arising from a larger portion of sandstones and grits in the Pennsylvanian rocks. The section extends from north of Pottsville to the country ranging immediately south of Orwigsburg. To the south of the vertical coal-measures and the subjacent conglomerate there are displayed successively—1st, a vast series, composed of red shales 3000 feet thick, of grey sandstone 2400 feet thick, and of red sandstone 6000 feet thick, the whole being considered by Mr. Lyell as portions of the old red sandstone; and 2nd, of olive-coloured shale containing Devonian fossils. The dip of the strata is either nearly vertical or inverted. Still further south, and a short distance north of Orwigsburg, the olive-coloured shales are succeeded by very highly inclined or inverted beds of upper Silurian rocks flanking a protruded band of lower Silurian strata; and lastly, on the southern confines of the section is a trough of the Devonian olive-coloured shales resting on the upper Silurian strata.

Beautiful exhibitions of the underclay with its associated plant, and of the overlying roof with its distinct remains, were observed by Mr. Lyell and Prof. Rogers at Tamaqua, in the southern coal-field.

The thinning out of the grits and conglomerates of the west causes the beds of anthracite to be brought more nearly together in this district; and Mr. Lyell says, the decrease in the thickness of the intervening strata prepares the observer for the union of several of the seams still farther east, and for the enormous thickness of the anthracite at various places near the village of Mauch Chunk, or Bear Mount, particularly at the well-known Lehigh-Summit Mines. At this point a mass of anthracite forty feet thick, deducting three intercalated fire-clays and a fine thin vein of impure coal, is quarried in open day, a covering of forty feet of sandstone being entirely removed. In the south mine, where there is a sharp anticlinal fold in the coal, the *Stigmariæ*-clay, four feet thick, was well seen, with nearly forty feet of coal above it and four below. In the Great mine Mr. Lyell observed the following section:—

Top, yellow quartzose grit.

Coal, two or three inches of the uppermost part of the bed being in the state of dust, as if they had been crushed or rubbed by the yellow quartzose grit.	5 feet.
Blue fire-clay with <i>Stigmariæ</i>	15 inches.
Coal, including two or three seams of an impure slaty nature	25 feet.
Blue fire-clay with <i>Stigmariæ</i>	2 feet.
Coal, with an intervening layer of hard, bituminous slate	8 feet.

The anthracite, as in other parts of these coal-measures, often exhibits a texture exactly like that of charcoal; and frequently impressions of striated leaves, exactly resembling, as pointed out by Prof. Rogers, those of liliaceous plants, particularly the iris.

Mr. Lyell, accompanied by Prof. Rogers, afterwards examined the Room Run mines, on the Nesquahoning, where he saw a splendid exhibition of *Stigmariæ* in a bottom clay, one stem, about three inches in diameter, being no less than thirty-five feet in length. In the roof of slaty sandstone were impressions of *Pecopteris*, *Glossopteris*, and other ferns.

At Beaver Meadow, or the middle coal-field, a bed of anthracite is overlaid as well as underlaid by *Stigmariæ* blue clay; the upper fire-clay, however, soon thins out, and is replaced by sandstone. No coal rested upon it, but Mr. Lyell observes that the carpeting of coal may not be always large enough to cover the flooring of fire-clay, or some change of circumstances or denudation may have interfered with the usual mode of deposition. Upon the whole, Mr. Lyell says, the accumulation of mud and *Stigmariæ* was, in Pennsylvania as in South Wales, the invariable forerunner of the circumstances attending the production of the coal-seams. The two extreme points at which he observed the *Stigmariæ*-clay, Blossberg and Pottsville, are about 120 miles apart in a straight line, and the analogy of all the phænomena at those places, and still more on both sides of the Atlantic, is, he says, truly astonishing. In conclusion, Mr. Lyell states, that he had just received a letter from Mr. Logan, announcing the existence of the bottom clay, with *Stigmariæ*, in Noya Scotia; and that Mr. Logan had visited Mauch Chunk.

Dec. 11.—A paper was read containing a “Description of the Remains of Six Species of Marine Turtles (*Chelones*) from the London Clay of Sheppey and Harwich.” By Richard Owen, Esq., F.R.S., F.G.S., Hunterian Professor in the Royal College of Surgeons.

The author commences by quoting the generalizations given in the latest works which treat of Fossil Chelonians, and examines the evidence on which those from the Eocene clay of Sheppey had been referred exclusively to the freshwater genus *Emys* by Cuvier and others, and he points out the circumstances which invalidate the conclusions that had been deduced from it. He then proceeds to describe the fossils and to show the characters by which he has established the existence of five species of marine turtles from the London Clay at Sheppey, and a sixth species from the same formation near Harwich.

1. *Chelone breviceps*.—The first species, found at Sheppey, is called by the author *Chelone breviceps*, and its unequivocal marine nature was recognised by a nearly perfect cranium, wanting only the occipital spine, and presenting a strong and uninterrupted roof, extended from the parietal spine on each side over the temporal openings; the roof being formed chiefly by a great development of the posterior frontals. Further evidence of its marine origin exists in the large size and lateral aspect of the orbits, their posterior boundary extending beyond the anterior margin of the parietals; also in the absence of the deep emargination which separates the superior maxillary from the tympanic bone in freshwater tortoises, especially the *Emys expansa*.

In general form the skull resembles that of the *Chelone Mydas*, but it is relatively broader, the anterior frontals are less sloping, and the anterior part of the head is more vertically truncate: the median frontals also enter into the formation of the orbits in rather a larger proportion than in *C. Mydas*. In *Chelone imbricata* they are wholly excluded from the orbits.

The trefoil shape of the occipital tubercle is well-marked; the laterally expanded spinous plate of the parietal bones is united by a straight suture to the post-frontals along three-fourths of its extent, and for the remaining fourth with the temporal or zygomatic element.

These proportions are reversed in the *Emys expansa*, in which the similarly expanded plate of the parietals is chiefly united laterally with the temporal bones. In other freshwater tortoises the parietal plate in question does not exist.

The same evidence of the affinity of the Sheppey Chelonite in question to the marine turtles is afforded by the base of the skull:—the basi-occipital is deeply excavated; the processes of the pterygoids which extend to the tympanic pedicles are hollowed out lengthwise; the palatal processes of the superior maxillary and palatine bones are continued backwards to the extent which characterizes the existing Chelonix; and the posterior or internal opening of the nasal passages is, in a proportional degree, carried further back in the mouth. The lower opening of the zygomatic spaces is wider in the Sheppey Chelonite than in the *Emys expansa*.

The external surface of the cranial bones in the fossil is broken by small irregular ridges, depressions, and vascular foramina, which give it a rough shagreen-like character.

The lower jaw, which is preserved in the present fossil, likewise exhibits two characters of the marine turtles; the dentary piece, *e. g.*, forms a larger proportion of the lower jaw than in land or fresh-water tortoises. The under part of the symphysis, which is not larger than in *Chelone Mydas*, is slightly excavated in the fossil.

In the rich collection of Sheppey fossils belonging to Mr. Bowerbank, there is a beautiful Chelonite, including the carapace, plastron, and the cranium, which is bent down upon the forepart of the plastron; and which, though mutilated, displays sufficient characters to establish its specific identity with the skull of the *Chelone breviceps* just described. The outer surface of the carapace and plastron has the same finely rugous character as that of the cranium, in which we may perhaps perceive a slight indication of the affinity with the genus *Trionyx*.

The carapace is long, narrow, ovate, widest in front, and tapering towards a point posteriorly; it is not regularly convex, but slopes away, like the roof of a house, from the median line, resembling in this respect, and its general depression, the carapace of the turtle. There are preserved eleven of the vertebral plates, the two last alone being wanting. The eight pairs of expanded ribs are also present, with sufficient of the narrower tooth-like extremities of the six anterior pairs to determine the marine character of the fossil, which is indicated by its general form. Other minute characters are detailed; and a comparison with the Chelonite from the tertiary beds near Brussels, figured by Cuvier, is instituted.

The sternum of the *Chelone breviceps*, although more ossified than in existing Chelonianæ, yet presents all the essential characters of that genus. There is a central vacuity left between the hyosternals and hyposternals; but these bones differ from those of the young *Emys* in the long pointed processes which radiate from the two anterior angles of the hyosternals, and the two posterior angles of the hyposternals.

The xiphisternals have the slender elongated form and oblique union by reciprocal gomphosis with the hyposternals, which is characteristic of the genus *Chelone*.

The posterior extremity of the right episternal presents the equally characteristic slender pointed form.

With these proofs of the sternum of the present fossil being modified according to the peculiar type of the marine Chelones, there is evidence, however, that it differs from the known existing species in the more extensive ossification of the component pieces: thus, the pointed rays of bone extend from a greater proportion of the margins of the hyo- and hyposternals, and the intervening margins do not present the straight line at right angles to the radiated processes.

In the *Chelone Mydas*, for example, one half of the external margin of the hyo- and hyposternals, where they are contiguous, are straight, and intervene between the radiated processes, which are developed from the remaining halves; while in the *Chelone breviceps* about a

sixth part only of the corresponding external margins are similarly free, and there form the bottom, not of an angular, but a semicircular interspace.

The radiated processes from the inner margins of the hyo- and hyposternals are characterized in the *Chelone breviceps* by similar modifications, but their origin is rather less extensive; they terminate in eight or nine rays, shorter and with intervening angles more equal than in existing *Chelones*. The xiphisternal piece receives in a notch the outermost ray or spine of the inner radiated process of the hyposternal, as in the *Chelones*, and is not joined by a transverse suture, as in the *Emydes*, whether young or old.

The characters thus afforded by the cranium, carapace, plastron, and some of the bones of the extremity, prove the present Sheppey fossil to belong to a true sea-turtle; and at the same time most clearly establish its distinction from the known existing species of *Chelone*; from the shortness of the skull, especially of the facial part as compared with its breadth, the author proposes to name this extinct species *Chelone breviceps*.

2. *Chelone longiceps*.—The second species of Sheppey turtle, called *Chelone longiceps*, is founded upon the characters of the cranium, carapace, and plastron. The cranium differs more from those of existing species, by its regular tapering into a prolonged pointed muzzle, than does that of the *Chelone breviceps* by its short and truncated jaws.

The surface of the cranial bones is smoother; and their other modifications prove the marine character of the fossil as strongly as in the *Chelone breviceps*.

The orbits are large, the temporal fossæ are covered principally by the posterior frontals, and the exterior osseous shield completely overhangs the tympanic and ex-occipital bones. The compressed spine of the occiput is the only part that projects further backwards.

The palatal and nasal regions of the skull afford further evidence of the affinities of the present Sheppey Chelonite to the Turtles. The bony palate presents in an exaggerated degree its great extent from the intermaxillary bones to the posterior nasal aperture, and it is not perforated, as in the *Trionyxes*, by an anterior palatal foramen.

The extent of the bony palate is relatively greater than in the *Chelone Mydas*; the trenchant alveolar ridge is less developed than in the *Chel. Mydas*; the groove for the reception of that of the lower jaw is shallower than in the existing *Chelonixæ*, or the extinct *Chel. breviceps*, arising from the absence of the internal alveolar ridge.

The present species is distinguished by the narrowness of the sphenoid at the base of the skull, and by the form and groove of the pterygoid bones, from the existing *Chelonixæ*, and *à fortiori* from the *Trionyxes*; to which, however, it approaches in the elongated and pointed form of the muzzle, and the trenchant character of the alveolar margin of the jaws.

The general characters of the carapace are next given, and a specimen from Mr. Bowerbank's collection is more particularly described.

This carapace, as compared with that of the *C. breviceps* in the same collection, presents the following differences: it is much broader

and flatter; the vertebral plates are relatively broader; the lateral angle, from which the intercostal suture is continued, is much nearer the anterior margin of the plate; the *C. longiceps* in this respect resembling the existing species: the expanded portions of the ribs are relatively longer; they are slightly concave transversely to their axis on their upper surface, while in *C. breviceps* they are flat. The external surface of the whole carapace is smoother, and although as depressed as in most turtles, it is more regularly convex, and sloping away by two nearly plane surfaces from the median longitudinal ridge of the carapace.

Among the minor differences of the two Sheppey fossils the author states, that the first vertebral plate of *C. longiceps* is more convex at its middle part, and sends backwards a short process to join the second vertebral plate, in which it resembles the *C. Mydas*. The second plate is six-sided, the two posterior lateral short sides being attached to the second pair of ribs, in which the present species differs from both *C. Mydas* and *C. breviceps*. The third vertebral plate is quadrangular instead of the second, as in *C. breviceps* and *C. Mydas*. The impressions of the epidermal scutes are deeper, and the lines which bound the sides of the vertebral scutes meet at a more open angle than in the *C. breviceps*, in which the vertebral scutes have the more regular hexagonal form of those of the *C. Mydas*.

The plastron is more remarkable than that of the *C. breviceps* for the extent of its ossification, the central cartilaginous space being reduced to an elliptical fissure. The four large middle pieces, called hyosternals and hyposternals, have their transverse extent relatively much greater, as compared with their antero-posterior extent, than in *C. breviceps*. The median margins of the hyosternals are developed in short toothed processes along their anterior two-thirds; and the median margins of the hyposternals have the same structure along their posterior halves.

The xiphisternals are relatively broader than in *C. breviceps* or in any of the existing species, and are united together by the whole of their median margins. The entosternal piece is flat on its under surface.

Each half of the plastron is more regularly convex than in *C. Mydas*. The breadth of the sternum along the median suture, uniting the hyosternals and hyposternals, is five inches; and the breadth at the junction of the xiphisternals with the hyposternals is two inches.

The posterior part of the cranium is preserved in this fossil, withdrawn beneath the anterior part of the carapace; the fracture shows the osseous shield covering the temporal fossæ; and the pterygoids remain, exhibiting the wide and deep groove which runs along their under part.

It has been most satisfactory, the author says, to find that the two distinct species of the genus *Chelone*, first determined by the skulls only, should thus have been established by the subsequent observation of their bony cuirasses; and that the specific differences manifested by the cuirasses should be proved by good evidence to be characteristic of the two species founded on the skulls.

Thus the portion of the skull preserved with the carapace first

described, served to identify that fossil with the more perfect skull of the *Chelone breviceps*, by which the species was first indicated. And, again, the portion of the carapace adhering to the perfect skull of the *Chelone longiceps* equally served to connect with it the nearly complete osseous buckler, which otherwise, from the very small fragment of the skull remaining attached to it, could only have been assigned conjecturally to the *Chel. longiceps*; an approximation which would have been the more hazardous, since the *Chel. breviceps* and *Chel. longiceps* are not the only turtles which swarm those ancient seas that received the enormous argillaceous deposits of which the isle of Sheppey forms a part.

3. *Chelone latiscutata*.—A considerable portion of the bony cuirass of a young turtle from Sheppey, three inches in length, including the 2nd to the 7th vertebral plates, with the expanded parts of the first six pairs of ribs, and the hyosternal and hyposternal elements of the carapace, most resembles that of the *Chelone coniceps* in the form of the carapace, and especially in the great transverse extent of the above-named parts of the sternum; it differs, however, from the *Chel. longiceps* and from all the other known Chelonites in the great relative breadth of the vertebral scutes, which are nearly twice as broad as they are long.

The central vacuity of the plastron is subcircular, and, as might be expected, from the apparent nonage of the specimen, is wider than in the *Chel. longiceps*; but the toothed processes given off from the inner margin of both hyo- and hyposternals are small, subequal, regular in their direction, and thus resemble those of the *Chel. longiceps*.

The length of the expanded part of the third rib is one inch seven lines; its antero-posterior diameter or breadth, six lines; in the form of the vertebral extremities of the ribs and of the vertebral plates to which they are articulated, the present fossil resembles the *Chel. longiceps*.

The author knows of no recent example, however, of the *Chelone* that offers such varieties in the form of its epidermal scutes as would warrant the present Chelonite being considered a variety merely of the *Chel. longiceps*; and he therefore indicates the distinct species which it seems to represent, by its main distinctive character, under the name of *Chelone latiscutata*.

4. *Chelone convexa*.—The fourth species of *Chelone*, indicated by a nearly complete cuirass, from Sheppey, holds a somewhat intermediate position between the *C. breviceps* and *C. longiceps*; the carapace being narrower and more convex than that of *C. coniceps*; broader, and with a concavity arising from a more regular curvature than in *C. breviceps*. The expanded parts of the ribs have an intermediate length with those of the two *Chelones* with which this specimen is compared, and therefore is a difference independent of age.

The distinction of *C. convexa* is still more strikingly established in the plastron, which in its defective ossification more nearly resembles that of the existing species of *Chelone*. All the bones, especially the xiphisternals, are more convex on their outer surface than in other turtles, recent or fossil. The internal rays of the hyosternals are

divided into two groups; the lower consisting of two short and strong teeth projecting inwards, while the rest extend forwards along the inner side of the episternals. The same character may be observed in the corresponding processes of the hyposternals, but the external process is relatively much narrower than in *C. breviceps*. The following differences are stated to distinguish the sternum of *C. convexa* from that of *C. Mydas*. The median margin of the hyposternals forms a gentle curve, not an angle: that of the hyposternals is likewise curved, but with a slight notch. The longitudinal ridge on the external surface, and near the median margin of the hyo- and hyposternals, is less marked in the Sheppey fossil; especially in the hyposternals, which are characterized by a smooth concavity in their middle.

The suture between the hyo- and hyposternals is nearer to the external transverse radiated process of the hyposternals. The median vacuity of the sternal apparatus is elliptical in the *Chel. convexa*, but square in the *Chel. Mydas*.

The characteristic lanceolate form of the episternal bone in the genus *Chelone* is well seen in the present fossil.

The true marine character of the present Sheppey *Chelonite* is likewise satisfactorily shown in the small relative size of the entire femur which is preserved on the left side, attached by the matrix to the left xiphisternal. It presents the usual form, a slight sigmoid flexure, characteristic of the *Chelones*; it measures one inch in length. In an *Emys* of the same size, the femur, besides its greater bend, is $1\frac{1}{2}$ inch in length.

5. *Chelone subcristata*.—The fifth species of *Chelone* from Sheppey, distinguishable by the characters of its carapace, approaches more nearly to the *Chelone Mydas* in the form of the vertebral scutes, which are narrow in proportion to their length, than in any of the previously described species; but is more conspicuously distinct by the form of the 6th and 8th vertebral plates, which support a short, sharp, longitudinal crest. The middle and posterior part of the first vertebral plate is raised into a convexity, as in the *Chel. longiceps*, but not into a crest.

The keeled structure of the sixth and eighth plates is more marked than in the fourth and sixth plates of *Chelone Mydas*, which are raised into a longitudinal ridge.

The characters of the carapace are then minutely described.

Sufficient of the sternum is exposed in the present fossil to show, by its narrow elongated xiphisternals, and the wide and deep notch in the outer margin of the conjoined hyo- and hyposternals, that it belongs to the marine *Chelones*.

The xiphisternals are articulated to the hyposternals by the usual notch or gomphosis; they are straighter and more approximated than in the *Chel. Mydas*; the external emargination of the plastron differs from that of the *Chel. Mydas* in being semicircular instead of angular, the *Chel. subcristata* approaching, in this respect, to the *Chel. breviceps*.

The shortest antero-posterior diameter of the conjoined hyo- and hyposternals is two inches seven lines. The length of the xiphi-

sternal two inches six lines. The breadth of both, across their middle part, one inch three lines.

The name proposed for this species indicates its chief distinguishing character, viz. the median interrupted carina of the carapace, which may be presumed to have been more conspicuous in the horny plates of the living animal than in the supporting bones of the fossilized carapace.

6. *Chelone planimentum*.—This species is founded on an almost entire specimen of skull and carapace of the same individual, in the museum of Prof. Sedgwick; on a skull and carapace belonging to different individuals, in the museum of Prof. Bell; and on a carapace in the British Museum; all of which specimens are from the London clay at Harwich.

The skull resembles, in the pointed form of the muzzle, the *Chel. longiceps* of Sheppey, but differs in the greater convexity and breadth of the cranium, and the great declivity of its anterior contour.

The great expansion of the osseous roof of the temporal fossæ, and the share contributed to that roof by the post-frontals, distinguish the present, equally with the foregoing Chelonites, from the fresh-water genera *Emys* and *Trionyx*. In the oblique position of the orbits, and the diminished breadth of the interorbital space, the present Chelonite, however, approaches nearer to *Trionyx* and *Emys* than the previously described species.

Its most marked and characteristic difference from all existing or extinct Chelones is shown by the greater antero-posterior extent and flatness of the under part of the symphysis of the lower jaw, whence the specific name here given to the species.

Since at present there is no means of identifying the well-marked species of which the skull is here described with the Chelonite figured in the frontispiece to Woodward's 'Synoptical Table of British Organic Remains,' and alluded to without additional description or characters as the '*Chelonia Harvicensis*' in the additions to Mr. Gray's 'Synopsis Reptilium,' p. 78, 1831; and since it is highly probable that the extensive deposit of Eocene clay along the coast of Essex, like that at the mouth of the Thames, may contain the relics of more than one species of our ancient British turtles, the author prefers indicating the species here described by a name having reference to its peculiarly distinguishing character, to arbitrarily associating the skull with any carapace to which the vague name of *Harvicensis* has been applied.

Besides the specimen of Chelonite from Harwich, in the museum of Norwich, figured by Woodward, there is a mutilated carapace of a young *Chelone* from the same locality in the British Museum. This specimen exhibits the inner side of the carapace, with the heads and part of the expanded bodies of four pairs of ribs. It is not sufficiently entire to yield good specific characters, but it demonstrates unequivocally its title to rank with the marine turtles. It is figured in Mr. Kœnig's 'Icones Sectiles,' pl. xvi. fig. 192, under the name of *Testudo plana*.

The carapace of a larger specimen of *Chelone*, from the coast of Harwich, was purchased, by the British Museum, of Mr. Charles-

worth, by whom a lithograph of the inner surface of this Chelonite, of the natural size, has been privately distributed, without description.

The carapace in the museum of Prof. Sedgwick, forming part of the same individual (*Chelone planimentum*) as the skull above described, exhibits many points of anatomical structure more clearly than the last-mentioned Chelonite in the British Museum; it also displays the characteristic coracoid bone of the right side in its natural relative position. The resemblance of this carapace in general form to that of the *Chelone caretta* is pretty close; it differs from that and other known existing turtles, and likewise from most of the fossil species, in the thickness and prominence of the true costal portions of the expanded vertebral ribs, which stand out from the under surface of the plate through their entire length, and present a somewhat angular obtuse ridge towards the cavity of the abdomen.

In the large proportional size of the head, the *Chelone planimentum* corresponds with the existing turtles; and that the extinct species here described attained larger dimensions than those given above, is proved by a fossil skull from the Harwich clay, in the collection of Prof. Bell, which exhibits well the character of the broad and flattened symphysis.

A carapace of a smaller individual of *Chelone planimentum* from the Harwich coast, with the character of the inwardly projecting ribs strongly marked, is likewise preserved in the choice collection of the same excellent naturalist. One of the hyosternal bones enclosed in the same nodule of clay testifies to the partial ossification of the plastron in this species.

In the summary of the foregoing details the author observes, that they lead to conclusions of much greater interest than the previous opinions respecting the Chelonites of the London basin could have originated. Whilst these were supposed to have belonged to a fresh-water genus, the difference between the present fauna and that of the Eocene period, in reference to the Chelonian order, was not very great; since the *Emys* or *Cistudo Europæa* still abounds on the Continent, and lives long in our own island in suitable localities; but the case assumes a very different aspect when we come to the conviction, that the majority of the Sheppey Chelonites belong to the true marine genus *Chelone*; and that the number of species of the Eocene extinct turtles already obtained from so limited a space as the isle of Sheppey exceeds that of the species of existing *Chelone*.

Notwithstanding the assiduous search of naturalists, and the attractions to the commercial voyager which the shell and the flesh of the turtles offer, all the tropical seas of the world have hitherto yielded no more than five well-defined species of *Chelone*, and of these only two, as the *C. Mydas* and *C. caretta*, are known to frequent the same locality.

The indications which the Sheppey turtles afford of the warmer climate of the latitude in which they lived, as compared with that which prevails there in the present day, accord with those which all the organic remains of the same depositary have hitherto yielded in reference to this interesting point.

That abundance of food must have been produced under such influences cannot, Mr. Owen states, be doubted; and he infers, that to

some of the extinct species—which, like the *C. coniceps* and *C. platygnathus*, exhibit either a form of head well adapted for penetrating the soil, or with modifications that indicate an affinity to the *Trionyxes*—was assigned the task of checking the undue increase of the extinct crocodiles of the same epoch and locality, by devouring their eggs or their young, becoming probably, in return, themselves an occasional prey to the older individuals of the same carnivorous saurian

MISCELLANEOUS.

RESULTS OF DEEP DREDGING.

To the Editors of the Annals of Natural History.

GENTLEMEN,—Observing my name in connection with an article in your Magazine of last month, showing the results of deep dredging off the Mull of Galloway, I am induced to trouble you with a few remarks as to those results.

The depths mentioned in that article are, I believe, far greater than any which had been previously explored on the British coast. My own experience (which has been very considerable) has not enabled me to obtain the result of any greater depth than 50 fathoms. But I was somewhat disappointed on perusing the article to observe such a scanty list of rariora and total absence of novelties, where such discoveries might have been well looked for, and also at the rare occurrence of living specimens. The species which appear to be peculiar to the west and north coasts of Scotland, and all of which I noticed in my list of Oban shells, (viz. the *Trichotropis acuminatus*, *Pecten niveus* and *Astarte semisulcata*,) appear to be wanting at the depths and locality explored by Capt. Beechey; besides the *Pecten aculeatus*, which has been also dredged off the Isle of Arran and in Cork Harbour. The *Trochus elegans* in my list of Oban shells (named *millegranus* in your Magazine) has been obtained by me from seven or eight different localities in Scotland and Ireland; and I this autumn procured it abundantly, by dredging off Fishguard, on the Pembrokeshire coast. *Nucula minuta*, and all the three species of *Lima*, have been found on different parts of the English coast. *Eulima Donovanii* (*E. polita* of British authors, but not of Risso, who first published the name,) was found by me to be not uncommon in the Shetland Isles.

Nothing at present occurs to me with reference to the recorded results of dredging obtained by my friend Mr. Forbes, as I presume his researches were instituted principally with a view to elucidate certain geological principles.

I take this opportunity of observing, that the *Eulima decussata* (n. s.) in my list of Oban shells had been previously found at Exmouth by Mr. Clark, who named it "*Pyramidella Jeffreysii*," and this autumn by myself at Fishguard. The *E. crassula* in the same list has not, as far as I can learn, been obtained from any other locality. The *Corbula rostrata* in the same list had been, it seems, previously published by Capt. Brown, under the name of *Anatina rostrata*, and Mr. Gray has proposed for it the new generic name of *Neara*.

I am, Gentlemen, your faithful servant,

10th October, 1842.

J. GWYN JEFFREYS, F.R. & L.SS.